

California Mathematics Standards Tests
Mathematics Blueprint

ALGEBRA I	
California Content Standards	Standards Being Tested
Symbolic reasoning and calculations with symbols are central in algebra. Through the study of algebra, a student develops an understanding of the symbolic language of mathematics and the sciences. In addition, algebraic skills and concepts are developed and used in a wide variety of problem-solving situations.	
Algebra I	65 items/100% of test
1.0 Students identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable:	✓
1.1 Students use properties of numbers to demonstrate whether assertions are true or false.	✓
2.0* Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents.	✓
3.0 Students solve equations and inequalities involving absolute values.	✓
4.0* Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x-5) + 4(x-2) = 12$.	✓
5.0* Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.	✓
6.0* Students graph a linear equation and compute the x - and y - intercepts (e.g., graph $2x + 6y = 4$). They are also able to sketch the region defined by linear inequality (e.g., they sketch the region defined by $2x + 6y < 4$).	✓
7.0* Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula.	✓
8.0 Students understand the concepts of parallel lines and perpendicular lines and how those slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point.	✓
9.0* Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.	✓
10.0* Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.	✓
11.0 Students apply basic factoring techniques to second- and simple third-degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, and recognizing perfect squares of binomials.	✓

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December 2000

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12.0 Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.	✓
13.0 Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.	✓
14.0 Students solve a quadratic equation by factoring or completing the square.	✓
15.0 Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.	✓
16.0 Students understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and functions.	✓
17.0 Students determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression.	✓
18.0 Students determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion.	✓
19.0 Students know the quadratic formula and are familiar with its proof by completing the square.	✓
20.0 Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.	✓
21.0 Students graph quadratic functions and know that their roots are the x -intercepts.	✓
22.0 Students use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x -axis in zero, one, or two points.	✓
23.0 Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.	✓
24.0 Students use and know simple aspects of a logical argument:	✓
24.1 Students explain the difference between inductive and deductive reasoning and identify and provide examples of each.	✓
24.2 Students identify the hypothesis and conclusion in logical deduction.	✓
24.3 Students use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion.	✓
25.0 Students use properties of the number system to judge the validity of results, to justify each step of a procedure, and to prove or disprove statements:	✓
25.1 Students use properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counterexamples to, claimed assertions.	✓
25.2 Students judge the validity of an argument according to whether the properties of the real number system and the order of operations have been applied correctly at each step.	✓

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December 2000

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25.3 Given a specific algebraic statement involving linear, quadratic, or absolute value expressions or equations or inequalities, students determine whether the statement is true sometimes, always, or never.	✓
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December 2000

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Mathematics Blueprint

GEOMETRY	
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The geometry skills and concepts in this discipline are useful to all students. Aside from learning these skills and concepts, students will develop their ability to construct formal, logical arguments and proofs in geometric settings and problems.	
Geometry	65 items/100% of test
1.0* Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning.	✓
2.0* Students write geometric proofs, including proofs by contradiction.	✓
3.0* Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement.	✓
4.0* Students prove basic theorems involving congruence and similarity.	✓
5.0 Students prove that triangles are congruent or similar, and they are able to use the concept of corresponding parts of congruent triangles.	✓
6.0 Students know and are able to use the triangle inequality theorem.	✓
7.0* Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals, and the properties of circles.	✓
8.0* Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.	✓
9.0 Students compute the volumes and surface areas of prisms, pyramids, cylinders, cones, and spheres; and students commit to memory the formulas for prisms, pyramids, and cylinders.	✓
10.0* Students compute areas of polygons, including rectangles, scalene triangles, equilateral triangles, rhombi, parallelograms, and trapezoids.	✓
11.0 Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.	✓
12.0* Students find and use measures of sides and of interior and exterior angles of triangles and polygons to classify figures and solve problems.	✓
13.0 Students prove relationships between angles in polygons by using properties of complementary, supplementary, vertical, and exterior angles.	✓
14.0* Students prove the Pythagorean theorem.	✓
15.0* Students use the Pythagorean theorem to determine distance and find missing lengths of sides of right triangles.	✓
16.0* Students perform basic constructions with straightedge and compass, such as angle bisectors, perpendicular bisectors, and the line parallel to a given line through a point off the line.	✓
17.0* Students prove theorems by using coordinate geometry, including the midpoint of a line segment, the distance formula, and various forms of equations of lines and circles.	✓

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December 2000

GEOMETRY	
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18.0*Students know the definitions of the basic trigonometric functions defined by the angles of a right triangle. They also know and are able to use elementary relationships between them. For example, $\tan(x) = \sin(x)/\cos(x)$, $(\sin(x))^2 + (\cos(x))^2 = 1$.	✓
19.0*Students use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side.	✓
20.0 Students know and are able to use angle and side relationships in problems with special right triangles, such as 30°, 60°, 90° triangles and 45°, 45°, 90° triangles.	✓
21.0*Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, and inscribed and circumscribed polygons of circles.	✓
22.0*Students know the effect of rigid motions on figures in the coordinate plane and space, including rotations, translations, and reflections.	✓
Geometry Total	65 items/100% of test

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ALGEBRA II/PROBABILITY AND STATISTICS	
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This discipline complements and expands the mathematical content and concepts of algebra I and geometry. Students who master algebra II will gain experience with algebraic solutions of problems in various content areas, including the solution of systems of quadratic equations, logarithmic and exponential functions, the binomial theorem, and the complex number system.	
Algebra II	60 items/92% of test
1.0* Students solve equations and inequalities involving absolute value.	✓
2.0* Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.	✓
3.0* Students are adept at operations on polynomials, including long division.	✓
4.0* Students factor polynomials representing the difference of squares, perfect square trinomials, and the sum and difference of two cubes.	✓
5.0* Students demonstrate knowledge of how real and complex numbers are related both arithmetically and graphically. In particular, they can plot complex numbers as points in the plane.	✓
6.0* Students add, subtract, multiply, and divide complex numbers.	✓
7.0* Students add, subtract, multiply, divide, reduce, and evaluate rational expressions with monomial and polynomial denominators and simplify complicated rational expressions, including those with negative exponents in the denominator.	✓
8.0* Students solve and graph quadratic equations by factoring, completing the square, or using the quadratic formula. Students apply these techniques in solving word problems. They also solve quadratic equations in the complex number system.	✓
9.0* Students demonstrate and explain the effect that changing a coefficient has on the graph of quadratic functions; that is, students can determine how the graph of a parabola changes as a , b , and c vary in the equation $y = a(x-b)^2 + c$.	✓
10.0* Students graph quadratic functions and determine the maxima, minima, and zeros of the function.	✓
11.0 Students prove simple laws of logarithms.	✓
11.1* Students understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	✓
11.2* Students judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.	✓
12.0* Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.	✓
13.0 Students use the definition of logarithms to translate between logarithms in any base.	✓
14.0* Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.	✓

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December 2000

ALGEBRA II/PROBABILITY AND STATISTICS	
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15.0*Students determine whether a specific algebraic statement involving rational expressions, radical expressions, or logarithmic or exponential functions is sometimes true, always true, or never true.	✓
16.0 Students demonstrate and explain how the geometry of the graph of a conic section (e.g., asymptotes, foci, eccentricity) depends on the coefficients of the quadratic equation representing it.	✓
17.0 Given a quadratic equation of the form $ax^2 + by^2 + cx + dy + e = 0$, students can use the method for completing the square to put the equation into standard form and can recognize whether the graph of the equation is a circle, ellipse, parabola, or hyperbola. Students can then graph the equation.	✓
18.0*Students use fundamental counting principles to compute combinations and permutations.	✓
19.0*Students use combinations and permutations to compute probabilities.	✓
20.0*Students know the binomial theorem and use it to expand binomial expressions that are raised to positive integer powers.	✓
21.0 Students apply the method of mathematical induction to prove general statements about the positive integers.	✓
22.0 Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.	✓
23.0*Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.	✓
24.0 Students solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions.	✓
25.0 Students use properties from number systems to justify steps in combining and simplifying functions.	✓
Probability and Statistics	5 items/8% of test
Algebra II/Probability and Statistics Total	65 items/100% of test

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GRADE 11	
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Algebra I	18 items/28% of test
5.0* Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.	✓
10.0* Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.	✓
12.0* Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.	✓
14.0* Students solve a quadratic equation by factoring or completing the square.	✓
15.0* Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.	✓
23.0* Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.	✓
Geometry	19 items/29% of test
4.0* Students prove basic theorems involving congruence and similarity.	✓
8.0* Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.	✓
15.0 Students use the Pythagorean theorem to determine distance and find missing lengths of sides of right triangles.	✓
17.0* Students prove theorems by using coordinate geometry, including the midpoint of a line segment, the distance formula, and various forms of equations of lines and circles.	✓
18.0* Students know the definitions of the basic trigonometric functions defined by the angles of a right triangle. They also know and are able to use elementary relationships between them. For example, $\tan(x) = \sin(x)/\cos(x)$, $(\sin(x))^2 + (\cos(x))^2 = 1$.	✓
21.0* Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, and inscribed and circumscribed polygons of circles.	✓
Algebra II	23 items/35% of test
2.0* Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.	✓
6.0* Students add, subtract, multiply, and divide complex numbers.	✓
7.0* Students add, subtract, multiply, divide, reduce, and evaluate rational expressions with monomial and polynomial denominators and simplify complicated rational expressions, including those with negative exponents in the denominator.	✓

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December 2000

GRADE 11	
California Content Standards	Standards Being Tested
10.* Students graph quadratic functions and determine the maxima, minima, and zeros of the function.	✓
12.0*Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.	✓
14.0 Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.	✓
15.0*Students determine whether a specific algebraic statement involving rational expressions, radical expressions, or logarithmic or exponential functions is sometimes true, always true, or never true.	✓
18.0*Students use fundamental counting principles to compute combinations and permutations.	✓
23.0*Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.	✓
Probability and Statistics	5 items/8% of test
Grade 11 Total	65 items/100% of test

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